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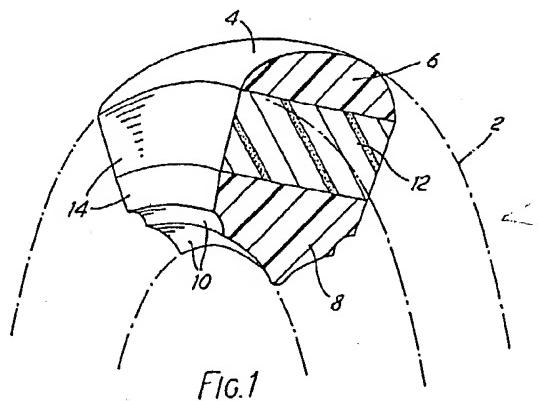
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## (54) Non pneumatic tyres

(57) The tyre (2) has a plurality of annular layers (6, 8 and 12) moulded from foamed plastics material. An outer layer (6) is moulded from a high density material to provide a wear resistant tread surface (4) and an inner layer (8) of high density material provides a rim-contacting surface 10. To impart improved suspension characteristics, an intermediate layer (12) moulded from a relatively low density material is provided.



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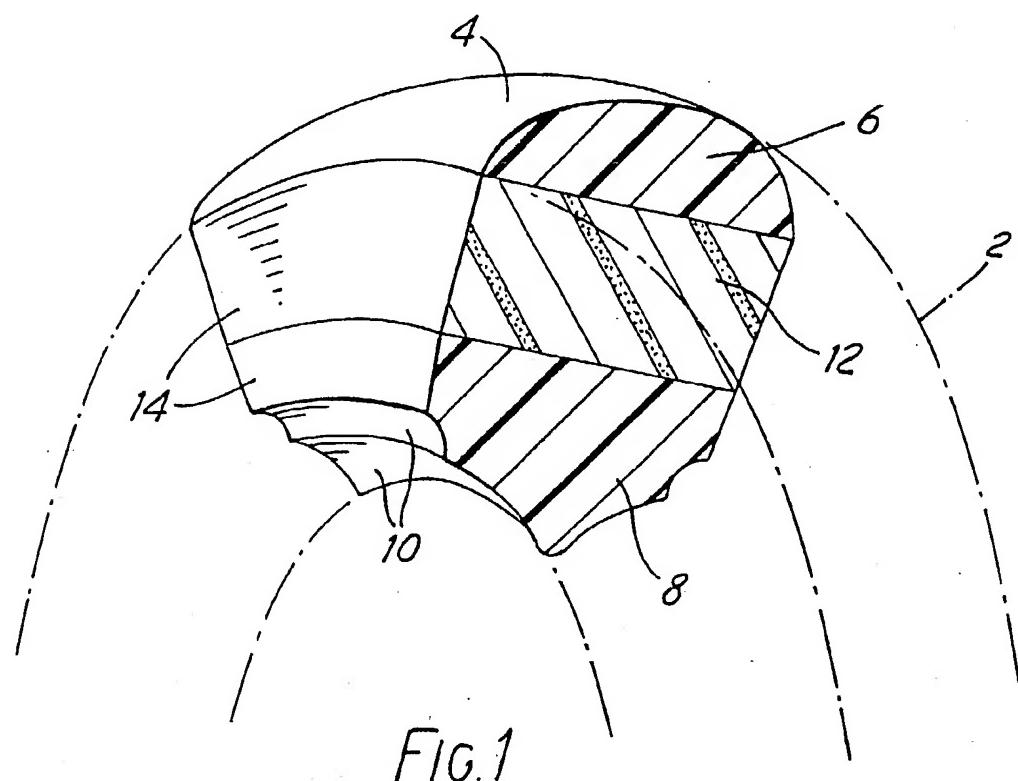


FIG. 1

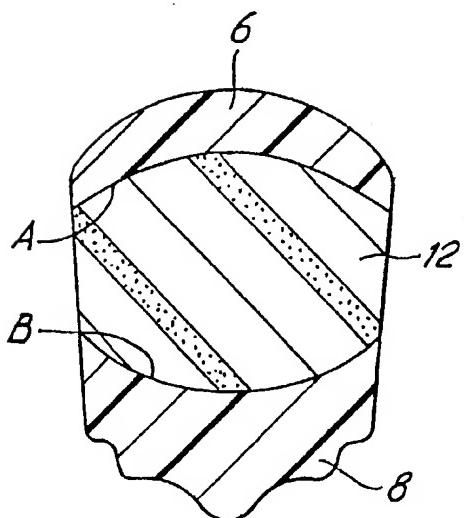


FIG. 2

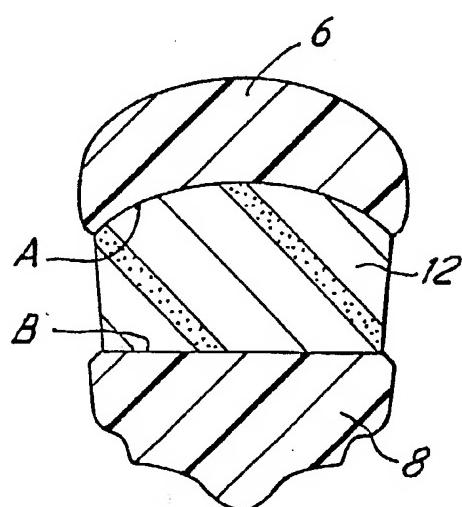


FIG. 3

## SPECIFICATION

## Tyres

5 The invention is concerned with improvements in or relating to tyres. Particularly, it refers to a type of tyre which is not inflated and is commonly known as a solid tyre.

Solid tyres are often used in situations where the 10 sudden deflation of a pneumatic tyre could possibly cause accident or injury for example to the occupant of a wheel chair or invalid chair. Tyres used for this purpose are in fact formed from heavy duty foamed material in order to impart "give" to the tyre in the 15 interest of the comfort of the occupant of the chair. Nevertheless, such tyres often give an unsatisfactory, hard ride.

It is an object of the invention to provide a so-called solid tyre which has improved ride characteristics.

The invention therefore provides a tyre suitable for use around the rim of a wheel and comprising an outer annular portion including a tread surface and comprising high density foamed plastics material, at 25 least one intermediate annular portion comprising a relatively low density foamed plastics material and an inner, rim-contacting portion of high density foamed plastics material, wherein the side wall surface of the tyre is formed at least partially from said 30 relatively low density material.

The intermediate annular portion may thus be termed a through layer of relatively low density material between two layers of high density material. It will be understood that more than one annular portion of low density material may be incorporated in the tyre if desired with an intervening annulus of high density material. Alternatively, there may be provided a plurality of intermediate annular portions of varying densities.

40 There will now be described three examples of tyres according to the invention. It will be understood that the description, which is to be read with reference to the drawings, is given by way of example only and not by way of limitation.

45 In the drawings:

*Figure 1* shows a section of a first tyre according to the invention illustrating a three-layer construction;

*Figure 2* shows a cross-sectional view of a second tyre; and

50 *Figure 3* shows a similar view of a third tyre.

*Figure 1* shows a tyre 2 having a tread surface 4 formed on an outer, annular portion 6 moulded in high density micropore polyurethane. An inner annular portion 8, also formed of high-density material 55 is contoured at 10 so as to be received around a wheel rim (not shown) in a firm fit.

Moulded in a through layer between portions 6 and 8 by a technique to be described below is an intermediate annular portion 12 formed from low density micropore polyurethane. It will be observed that the annular portion 12 forms part of the side wall 14 of the tyre and it will be apparent that the portion 12 may, if desired, be of a different colour than that of portions 6 and 8, for example for decorative reasons, 65 or for use in identification of the various degrees of

yieldability of the polyurethane used. Thus tyres may be formed with degrees of hardness of ride comparable with a pneumatic tyre at high or lower levels of inflation.

70 The tyres may be manufactured by any convenient method. For example a conventional solid tyre moulding cavity may be provided with an annular core separating the cavity into two secondary cavities. When the portions 6 and 8 have been moul-

75 ded, the core is removed, the mould member re-closed and low density polyurethane caused to form the portion 12 which unites the portions 6 and 8 into the complete tyre. If preferred, the portions 6 and 8 into the complete tyre. If preferred, the portions 6

80 and 8 may of course be moulded separately and assembled into the mould cavity for introduction of the constituents forming the portion 12. Figures 2 and 3 show alternative arrangements of the boundary lines A, B, between the three portions,

85 either curved (concave/convex) or a combination of curved and straight. Various ride characteristics may be attained in this way, since the degrees of hardness required may be readily determined just as with the use of pneumatic tyres. However, the so-called roll

90 ing resistance is unimpaired and the tyre according to the invention presents no greater risk of the tyre being caused inadvertently to roll off the rim in use, even though it is capable of much better shock absorption. A satisfactory combination of good roll

95 resistance and good shock absorption has not hitherto been obtainable in a solid tyre.

Various modifications may be made within the scope of the invention as defined in the following claims.

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## CLAIMS

1. A tyre suitable for use around the rim of a wheel, comprising an outer annular portion including a tread surface and comprising high density foamed plastics material, at least one intermediate annular portion comprising a relatively low density foamed plastics material and an inner, rim-contacting portion of high density foamed material,

110 in which the side wall surface of the tyre is foamed at least partially from said relatively low density material.

2. A tyre as claimed in claim 1, in which more than one annular portion of low density material is incorporated in the tyre, with an intervening annulus of high density material.

3. A tyre as claimed in claim 1 or claim 2, in which a plurality of intermediate annular portions of varying densities are provided.

120 4. A tyre as claimed in any one of the preceding claims, in which the inner annular portion is contoured so as to be received around a wheel rim in a firm fit.

5. A tyre as claimed in any one of the preceding 125 claims, in which the intermediate annular portion is formed from low density micropore polyurethane.

6. A method of manufacturing a tyre as claimed in claim 1, in which a conventional solid tyre moulding cavity is provided with an annular core separating the cavity into two secondary cavities, when the

outer and inner portions have been moulded, the core is removed, the mould member re-closed and low density plastics material caused to form the intermediate portion which unites the outer and inner

5 portions to form the complete tyre.

7. A method of manufacturing a tyre as claimed in claim 1, in which the outer and inner portions are moulded separately and assembled into a mould cavity for introduction of the constituents forming

10 the intermediate portion.

8. A tyre suitable for use around a rim of a wheel, constructed and arranged substantially as hereinbefore particularly described with reference to any one of the accompanying drawings.

15 9. A method of manufacturing a tyre suitable for the use around a rim of a wheel substantially as hereinbefore described.

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